Information Bulletin

Grade 6 Science 1997-98

Students First!
Student Evaluation

Alberta
EDUCATION

This document was written primarily for:

Students	✓
Teachers	✓ Grade 6 Teachers
Administrators	✓
Parents	
General Audience	
Others	✓ Superintendents

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This bulletin contains general information about the Achievement Testing Program and information specific to the Grade 6 Science Achievement Test. **It replaces all previous bulletins.**

September 1997

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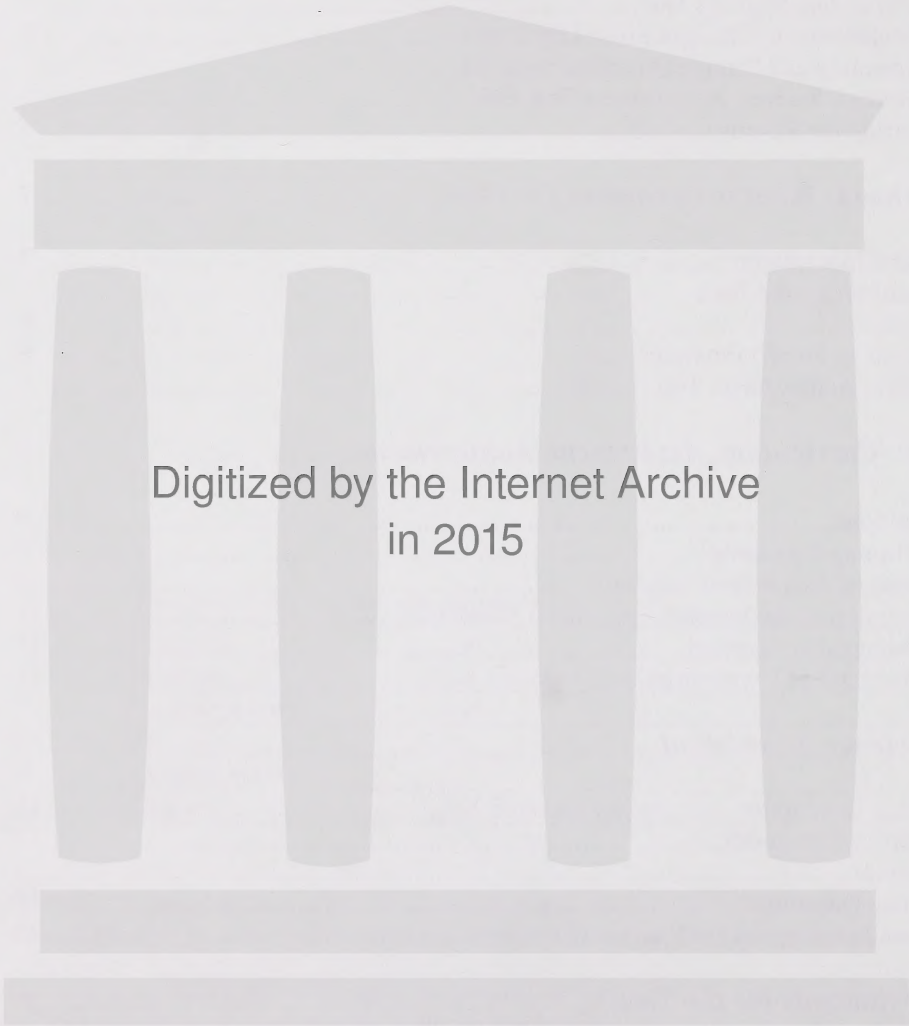
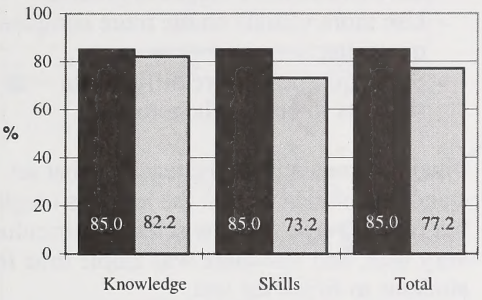


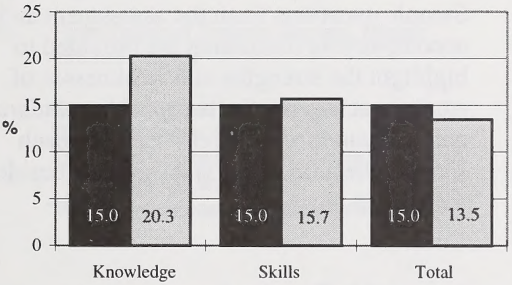
Looking Back: Highlights of 1997

This information provides teachers, school administrators, and the public with an overview of the results for the June 1997 Grade 6 Science provincial assessment. It complements the detailed school and jurisdiction reports.

Acceptable Standard



Standard of Excellence



Achievement Standards*

Actual Results**

*the percentage of students in the province expected to meet the acceptable standard and the standard of excellence

**the percentage of students in the province who met the standards (based on those who wrote)

Who Wrote the Test?

Students registered in Grade 6 and receiving instruction on the *Revised Elementary Program of Studies, May 1996*, were expected to write the 1997 Science assessment. A total of 38 592 students completed this assessment. In 1997, only a small proportion of students in Grade 6 did not write the test: 2.7% of students were absent and 3.0% of students were excused from writing by their superintendent.

What Was the Test Like?

The assessment instrument had 50 multiple-choice questions in five topic areas: Inquiry and Problem Solving, Aerodynamics and Flight, Sky Science, Evidence and Investigation, and Trees and Forests. Two learning components were assessed: Knowledge (18 questions) and Skills (32 questions). Students recorded their responses to questions on a separate answer sheet.

How Well Did Students Do?

As shown by the graphs, the number of students achieving the *acceptable standard* was 77.2%. The number of students achieving the *standard of excellence* was higher than expected in both the knowledge and skills components of the test but lower than expected on the total test. This indicates that students that do well on the knowledge component of the test do not necessarily do well on the skills component of the test, and vice versa.

In 3.7% of the schools, the percentage of students achieving the *acceptable standard* was significantly above expectations for the province. In 62.5% of the schools, the percentage was not significantly different from provincial

expectations. In 33.8% of schools, the percentage of students meeting the *acceptable standard* was significantly below provincial expectations. Schools where fewer than five students wrote the Grade 6 test are not included in these school calculations.

The results presented in this material are based on scores achieved by all students who wrote the test, except those who wrote the French translation of the test. Results for these students are reported separately. Results for students who wrote the French translation of the Grade 6 Science Achievement Test based on the former program of studies will also be reported separately.

Has Achievement Changed Since Last Year?

A comparison of the results on the common items appearing on both the 1996 Form B test and 1997 tests shows that student achievement has improved. The 1996 provincial average on the 27 common items was 16.6 whereas, the 1997 provincial average on the same items was 17.6.

Commentary and Sample Questions from the Grade 6 Science Achievement Test 1997

The Grade 6 science teachers who were involved in setting standards indicated that the test included a broad range of questions that assessed the new curriculum very well. The following list summarizes some of their feedback regarding the strengths of the test.

- Full range of difficulty in the questions
- Wide variety of charts, diagrams, and visual cues for students to use
- Format allows for students to see connections in the real world
- Good variety in terms of skills and knowledge objectives tested
- Questions are relevant and meaningful, and allow for real-life connections to be made

Teachers also provided feedback regarding how the test could be improved.

- Questions need to be less complex, some have two to three stages to process
- Use more visuals on the more complex questions
- Some questions were difficult for students to know where to start

Final comments from the teachers that set standards, indicated that the test was tough but fair, covered the new science curriculum very well, and that there was ample time for students to finish the test.

The following questions are no long secured. Sample questions from the assessment and accompanying discussion are provided to highlight the strengths and weaknesses of students achieving the *acceptable standard* and the *standard of excellence*. For each sample question, there is an asterisk beside the correct answer.

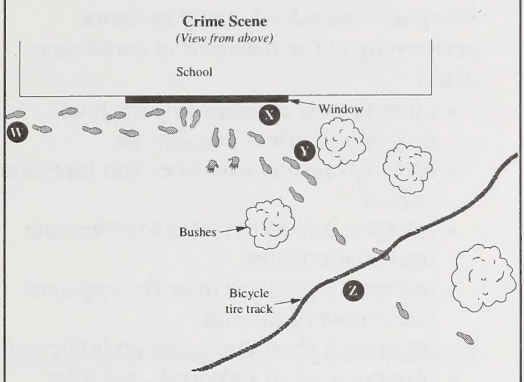
Acceptable Standard

Overall, results show that most students who met the *acceptable standard* but not the *standard of excellence* were able to

- interpret data from a wind-chill chart
- interpret growth patterns of trees to indicate growing conditions
- recognize the role of trees in giving off oxygen
- observe and interpret evidence to formulate an inference
- observe a set of footprints and infer travel speed
- interpret a diagram to identify a specific pattern

Use the following information to answer question 40.

Inspector Drake examined the area and discovered that the thief had entered through a window. Inspector Drake drew this diagram of what he observed outside the window.



40. From Inspector Drake's diagram, Megan inferred that the

- **A.** window had been broken
- **B.** thief was a man
- **C.** thief stopped between the bushes to tie his or her shoes
- ***D.** bicycle passed by after the thief left

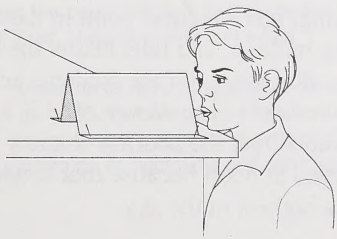
In **question 40**, students were required to read and interpret the text presented to develop an understanding of the evidence presented at the crime scene. From that point, students had to consider whether or not the events listed in the alternatives were inferences that could be made from Inspector Drake's diagram. Of the students who met the *acceptable standard* but not the *standard of excellence*, 78.7% correctly inferred that the bicycle passed by after the thief left.

In addition to the questions that students who met the *standard of excellence* had difficulty with, many students achieving the *acceptable standard* experienced difficulty in correctly answering questions that required them to

- observe and interpret growth pattern of trees
- order the phases of the Moon
- predict the apparent movement of constellations
- recognize a position in the predictable phases of the Moon
- predict the next step in an investigation

Use the following information to answer question 4.

To demonstrate the effects of air movement, the pilot asked Peter to blow air through a paper tent.



4. Peter **correctly** predicted that if he blew air through this paper tent,

- ***A.** both sides would bend inward
- **B.** both sides would bend outward
- **C.** neither side would bend
- **D.** one side would bend inward and the other would bend outward

In **question 4**, students were required to predict what would happen to a paper tent when air was blown through it. Students had to interpret the illustration and the brief description, and then recall their knowledge and understanding of Bernoulli's Principle. Simply put, Bernoulli's Principle states that fast-moving air creates differences in pressure. Students needed to recognize that the fast-moving air inside the test created a low pressure with respect to the air pressure exerted on the outside of the paper tent. Only 56.7% of the students who met the *acceptable standard* but not the *standard of excellence* correctly predicted that both sides of the tent would bend inward.

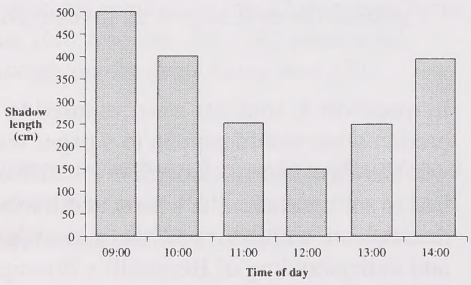
Standard of Excellence

Students who met the *standard of excellence* demonstrated more success than did other students. In addition to the successes identified for students achieving the *acceptable standard*, many students performing at the *standard of excellence* could

- identify how changes in parachute design will effect descent
- identify reasons why trees and forests are valued
- interpret a food pyramid to determine interrelationships
- interpret a graph to infer the apparent movement of the sun
- interpret a chart and make an inference
- observe a set of footprints and infer activity

Use the following information to answer question 22.

Throughout the day, Natalie had measured the length of her shadow and made the following graph.



22. Natalie observed that she cast the shortest shadow at noon. She concluded that the reason for this was that the

A. season is winter
B. Sun is low in the sky
***C.** Sun is high in the sky
D. sky is cloudy

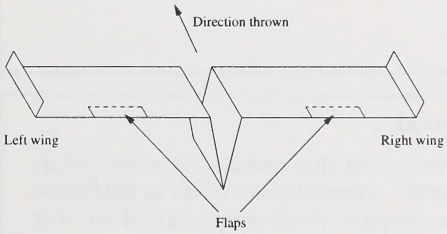
In **question 22**, students were required to read and interpret the graph that illustrates the relationship between shadow length and the time of day. The stem of the question provides students with the information that between the hours of 09:00 and 14:00, shadow length was shortest at noon. In order to make a connection between the question and the graph, students first had to recall that 12:00 is noon. Students had to apply their knowledge that the Sun is responsible for casting shadows. In addition, the sun rises above the horizon in the morning, has a highest point in the sky during midday, and falls below the horizon in the afternoon. Of the students achieving the *standard of excellence*, 97.1% correctly concluded that the shortest shadow is observed at noon because that is when the Sun is highest in the sky.

Many students achieving the *standard of excellence* experienced some difficulty in correctly answering questions that required them to

- infer whether a model airplane will turn right or left
- interpret a chart to identify the propeller that creates the most lift
- interpret a diagram to infer that a star emits light
- interpret an experimental design and identify variables
- apply observation skills to analyze and identify handwriting
- interpret an investigative design to identify variables

Use the following information to answer question 2.

Natalie told the pilot that she had experimented with airplane designs in school. She constructed one of the designs with paper, as shown below. When it was first thrown, this paper airplane glided in a straight line.



2. To get the paper airplane to bank to the left on its next flight, Natalie should fold a flap

***A.** down on its right wing and up on its left wing
B. up on its right wing and down on its left wing
C. up on its left wing and up on its right wing
D. down on its right wing and down on its left wing

In **question 2**, students were required to read and interpret information presented in text and the illustration of the paper airplane. In addition, students had to make two important observations. First, they had to recognize the direction in which the airplane was thrown, and second, they had to recognize that initially the flaps on the wings are neither up nor down. Students responding correctly to the question had to know how flaps contribute to the banking of an airplane. Only 66.7% of students achieving the *standard of excellence* either knew or inferred that in order for the plane to bank to the left, the flap on the right would have to be folded down and the flap on the left wing would have to be folded up. In these positions, air moving below the right wing and above the left wing would push against the respective flaps, thus causing the left wing to lower and the right wing to rise.

Reporting the Results

On August 22, 1997, each school jurisdiction received, electronically, a district report and individual school reports regarding their students' achievement, as well as guidelines for interpreting these results in relation to provincial standards.

To facilitate reflection on school programs, we expect that results will be shared with all school staff (not just teachers of grades 3, 6, and 9), as well as with parents and the community.

Two copies of an individual profile for each student were sent to the school that the student will attend in September. We expect that the Parent Copy will be given to parents and the School Copy will remain with the student's record.

The following Achievement tests are secured:
Grade 6 Mathematics, 1995
ALL tests from 1996 and 1997

Looking Ahead: What is Upcoming for 1998

General Information

Purpose

The purpose of the Achievement Testing Program is to

- determine if students are learning what they are expected to learn
- report to Albertans how well students have achieved provincial standards at given points in their schooling
- assist schools, jurisdictions, and the province in monitoring and improving student learning

Enhance Student Learning

Careful examination and interpretation of the results can help identify areas of relative strength and weakness in student achievement. Teachers and administrators can use this information in planning and delivering relevant and effective instruction in relation to broad, general learnings in the *Program of Studies*.

Enable Accountability

Alberta Education and school jurisdiction personnel are responsible for ensuring that the highest quality education is provided to all students in the province.

Information about achievement is provided to

- schools and jurisdictions
- parents
- the public

so that they may know how well students in their schools are meeting local targets and provincial expectations.

Interpreting Results

Achievement tests assess only part of what is to be learned. In addition, many factors contribute to student achievement. Personnel at the jurisdiction and school levels are in the best position to appropriately interpret, use, and communicate jurisdiction and school results in the local context.

The Achievement Testing Program provides teachers, parents, students, school administrators, Alberta Education, and the public with information about what students know and can do in relation to provincial standards. Group results are reported at school, district, and provincial levels to improve learning opportunities for students.

The assessments are administered in two subject areas at Grade 3—language arts and mathematics—and in four subject areas at grades 6 and 9—language arts, mathematics, social studies, and science.

The assessments are based on provincial standards, which reflect important learnings in the subject areas listed above. Classroom teachers from across the province are extensively involved in developing and field testing the assessment instruments.

Administering the Tests

Information about the nature of the provincial tests as well as their administration to special needs students can be found in the *General Information Bulletin, Achievement Testing Program,* which is mailed each fall to all superintendents and principals.

Schedule

The schedule for administering achievement tests in the 1997–98 school year is mandated.

January 1998

The January achievement Tests for Grade 9 schools on a semester system must be administered according to the following schedule

Wednesday, January 21	9:00 to 11:30 A.M.	Grade 9 English Language Arts Part A
Thursday, January 22	9:00 to 10:45 A.M.	Grade 9 Science
Friday, January 23	9:00 to 11:30 A.M.	Grade 9 Français/French Language Arts Partie A
Monday, January 26	9:00 to 10:45 A.M.	Grade 9 English Language Arts Part B
Tuesday, January 27	9:00 to 10:45 A.M.	Grade 9 Mathematics
Wednesday, January 28	9:00 to 10:45 A.M.	Grade 9 Social Studies
Thursday, January 29	9:00 to 10:45 A.M.	Grade 9 Français/French Language Arts Partie B

May 1998

The written component of the language arts achievement tests for grades 3, 6, and 9 must be administered according to the following schedule:

Tuesday, May 26	9:00 to 10:30 A.M.	Grade 3 English Language Arts Part A
	9:00 to 11:30 A.M.	Grades 6 and 9 English Language Arts Part A
Thursday, May 28	9:00 to 11:30 A.M.	Grades 6 and 9 Français/French Language Arts Partie A

June 1998

The machine-scorable component of achievement tests for grades 3, 6, and 9 must be administered according to the following schedule:

Monday, June 15	9:00 to 10:30 A.M.	Grade 3 English Language Arts Part B
	9:00 to 10:30 A.M.	Grade 6 English Language Arts Part B
Wednesday, June 17	9:00 to 10:30 A.M.	Grade 3 Mathematics
	9:00 to 10:30 A.M.	Grade 6 Mathematics
Thursday, June 18	9:00 to 10:30 A.M.	Grade 6 Social Studies
	9:00 to 10:45 A.M.	Grade 9 Français/French Language Arts Partie B
Friday, June 19	9:00 to 10:45 A.M.	Grade 9 Science
Monday, June 22	9:00 to 10:30 A.M.	Grade 6 Science
	9:00 to 10:45 A.M.	Grade 9 English Language Arts Part B
Tuesday, June 23	9:00 to 10:30 A.M.	Grade 6 Français/French Language Arts Partie B
	9:00 to 10:45 A.M.	Grade 9 Mathematics
Wednesday, June 24	9:00 to 10:45 A.M.	Grade 9 Social Studies

The tests that will be administered each year are:

Grade 3
English Language Arts (*Part A: Writing* and *Part B: Reading*)
Mathematics (English and French forms)

Grade 6
English Language Arts (*Part A: Writing* and *Part B: Reading*)
Français/French Language Arts (*Partie A: Production écrite* and *Partie B: Lecture*)
Mathematics (English and French forms)
Science (English and French forms)
Social Studies (English and French forms)

Grade 9
English Language Arts (*Part A: Writing* and *Part B: Reading*)
Français/French Language Arts (*Partie A: Production écrite* and *Partie B: Lecture*)
Mathematics (English and French forms)
Science (English and French forms)
Social Studies (English and French forms)

Students in French Programs

All students in French programs must write English Language Arts, French Language Arts, and French versions of other achievement tests if their language of instruction is French. Alberta Education will send a checklist to schools in January requesting an indication of how many English or French tests are required. These forms must be returned through jurisdiction offices by mid-February.

Marking Achievement Tests Locally

Teachers are able to mark the tests before returning them to Alberta Education. Teachers can use the results as part of an individual student's year end assessment, as well as for planning instruction.

Standards: Curriculum, Assessment, Achievement

The move toward results-based curricula has re-emphasized the need for a clear delineation of standards and their purpose. All standards and all methods of setting standards require judgement. Local targets are also discussed in this section.

> The process of setting a standard can only be as good as the judgements that go into it. The standard will depend on whose judgements are involved in the process. In this sense, all standards are subjective. Yet once a standard has been set, the decisions based on it can be made objectively. Instead of a separate set of judgements for each test-taker, you will have the same set of judgements applied to all test-takers. Standards cannot be objectively determined, but they can be objectively applied.[1]

Definitions

The Achievement Testing Program is directly concerned with three different but related standards. These provincial standards are curriculum standards, assessment standards, and achievement standards.

[1] Passing Scores; Samuel A. Livingston, Michael J. Zieky; Educational Testing Service, 1982.

- **Curriculum Standards** are the expected student learnings sequenced into grade levels. They include broad statements of knowledge, skills, and attitude expectations against which student performance is judged. These standards are established in the process of curriculum development and are found in the *Program of Studies* document produced for each subject.

- **Assessment Standards** are the criteria adopted for judging actual student achievement relative to curriculum standards. They are ultimately expressed and applied to test scores. They are derived from answers to questions such as: What scores must a student obtain or how many questions on a given test must a student answer correctly in order for his/her performance on the test to be judged as acceptable or excellent?

- **Achievement Standards** are judgements that specify what percentages of students are expected to achieve an acceptable and an excellent level of performance in relation to each course of studies; i.e., to the relevant curriculum standards. They reflect a community judgement about what is an appropriate expectation for students. It is important to point out that this judgement is not a prediction of the percentage of students who will actually achieve acceptable or excellent levels of performance, but rather a specification of the percentage of students at a given grade or year in school who are *expected* to achieve the acceptable (85%) or excellent standard (15%). **The 85% of students expected to meet the *acceptable standard* includes those students who meet the *standard of excellence***. These standards apply to school, jurisdiction, and provincial performance.

- **Local targets** are goals set in schools/districts to focus plans for helping students learn what is expected by the provincial government. These local targets reflect the specific needs of students, the views of teachers, school administration, and the local community, and the resources available to provide learning opportunities for students.

Confirming Standards

Confirming standards is a process in which some teachers are asked to make judgements about the achievement test to answer the question of whether province-wide performance is good enough. For more information on the confirming standards process, refer to Appendix A of the *Achievement Testing Provincial Report, June 1993 Administration*. For information on the selection of teachers for participation in the confirming standards process, refer to the current *General Information Bulletin, Achievement Testing Program.*

Purpose of Assessment Standards

The provincial standards are the basis upon which we assess how well students have learned science by the end of Grade 6. These standards reflect the essential learnings that all Alberta students are expected to achieve. Provincial standards are useful, therefore, for assessing Grade 6 students in all types of school programs—public, private, and home education. By comparing actual results to provincial standards, decisions can be made about whether achievement is in fact "good enough."

Description of the Science Assessment Standards

The following statements describe what is expected of Grade 6 students who are meeting the *acceptable standard* or the *standard of excellence* on independent work at the end of the Grade 6 Science program. The statements represent the standards against which student achievement will be measured.

Acceptable Standard

Skills—Students who meet the *acceptable standard* in Grade 6 Science can design and carry out an investigation in which variables are identified and controlled, and which provide a fair test of the question being investigated. They recognize the importance of accuracy in observation and measurement, and apply suitable methods to record, compile, interpret, and evaluate observations and measurements. They can also design and carry out an investigation of a practical problem involving the construction or modification of a device that moves through air, and they can develop a possible solution.

Knowledge—Students who meet the *acceptable standard* can describe the properties of air and the interactions of air with objects in flight. They can construct devices that move through air, and identify adaptations for controlling flight. These students can observe, describe, and interpret the movement of objects in the sky, and identify pattern and order in these movements. They can apply knowledge of the properties and interactions of materials to an investigation and identification of a material. They can also describe characteristics of trees and the interaction of trees with other living things in the local environment.

Attitudes—Students achieving the *acceptable standard* demonstrate positive attitudes for the study of science and for the application of science in responsible ways.

Standard of Excellence

Skills—Students who meet the *standard of excellence* in Grade 6 Science can design, carry out, and evaluate an investigation in which variables are identified and controlled with ease. The investigation provides a fair test of the question being investigated and the student readily identifies new questions that may also be explored. They are accurate in making observations and measurements; apply novel methods to record, compile, interpret, and evaluate observations and measurements. They can also design, carry out, and evaluate an investigation of a practical problem involving the construction or modification of a device that moves through air, and they can develop a workable solution.

Knowledge—Students who meet the *standard of excellence* can describe in detail the properties of air and the interactions of air with objects in flight. They can construct aerodynamic devices that move through air, and identify and make adaptations for controlling flight. These students can observe the movement of objects in the sky, make detailed descriptions and accurate interpretations about these movements, and identify specific patterns of them. They can apply knowledge of the properties and interaction of materials with precision. They can provide clear descriptions of the characteristics of trees and the interaction of trees with other living things in the local environment.

Attitudes—Students achieving the *standard of excellence* demonstrate positive attitudes for the study of science and for the application of science in responsible ways. They demonstrate confidence in their personal ability to learn and develop problem-solving skills, perseverance in the search for understanding, and critical-mindedness in examining evidence and determining what the evidence means.

Grade 6 Science Assessment

The Grade 6 Science assessment measures the overall growth in student learning through the elementary science program with particular emphasis on Grade 6.

General Description

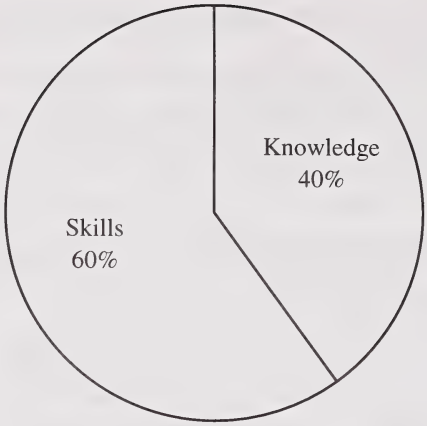
The assessment instruments consist of 50 multiple-choice questions. The questions in the achievement test are integrated in real-life contexts. Frequently, a number of questions may be clustered around a common context. Students will record their answers on a separate answer sheet. The assessment is designed to be completed in 60 minutes. However, additional time of up to 30 minutes may be provided to allow students to finish.

Students will need HB pencils, erasers, and scrap paper. Calculators are not required for successful completion of the assessment but are permitted.

Reporting Categories

The assessment is limited to those areas of learning that may be efficiently assessed using paper and pencil.

The learning components and skills are integrated in the assessment. The knowledge component includes the fundamental understanding of concepts and processes of science. The skills component refers to the application of knowledge. The following circle graph shows the approximate emphasis for the reporting categories of knowledge and skills.



Questions for the assessment based on the current expectations for Grade 6 Science will have the context drawn from the following topics

1. Air and Aerodynamics
2. Flight
3. Sky Science
4. Evidence and Investigations
5. Trees and Forest

To assist students in understanding the contexts used in the test, teachers should ensure that students know the meaning of the following words and phrases.

vacation
pilot
wind speed
cast a shadow
mascot
luggage
rough planks
flight attendant
display case
tree stump
nibbled
airplane dive
auto-pilot
air mattress
air cadet
jet fighter
search and rescue
alleged crime
flare gun
lean-to shelter
airport
air traffic control tower
parachutists
boarded the plane
detectives
sawmill
sawdust
windowsill
ransom note
biologist
head waters
retractable
airflow
wind sock
plowed black field
tent pole
R.C.M.P. detachment
food rations
ransacked

Blueprint

The emphasis for the achievement test is based on the current learning expectations as presented in the blueprint.

Expectations	Learning Components Number of Questions (%)		Number of Questions (%)
Students are expected to:	**Knowledge**	**Skills**	
Work cooperatively with others to design and carry out an investigation in which variables are identified and controlled; recognize the importance of accuracy in observation and measurement, and apply suitable methods to record, compile, interpret, and evaluate observations and measurements gathered by self and group; work cooperatively with others in designing and carrying out an investigation of a practical problem and in developing a possible solution	2 (4)	12 (24)	14 (28)
Describe properties of air and the interactions of air with objects in flight; construct devices that move through air; identify adaptations for controlling flight	9 (18)	5 (10)	14 (28)
Observe, describe, and interpret the movement of objects in the sky; identify pattern and order in these movements	4 (8)	3 (6)	7 (14)
Apply observation and inference skills to recognize and interpret patterns, to distinguish a specific pattern from among a group of similar patterns and to apply a knowledge of the properties and interactions of materials to the investigation and identification of a material sample		6 (12)	6 (12)
Describe characteristics of trees and the interaction of trees with other living things in the local environment	5 (10)	4 (8)	9 (18)
Total Number of Questions (%)	20 (40)	30 (60)	50 (100)

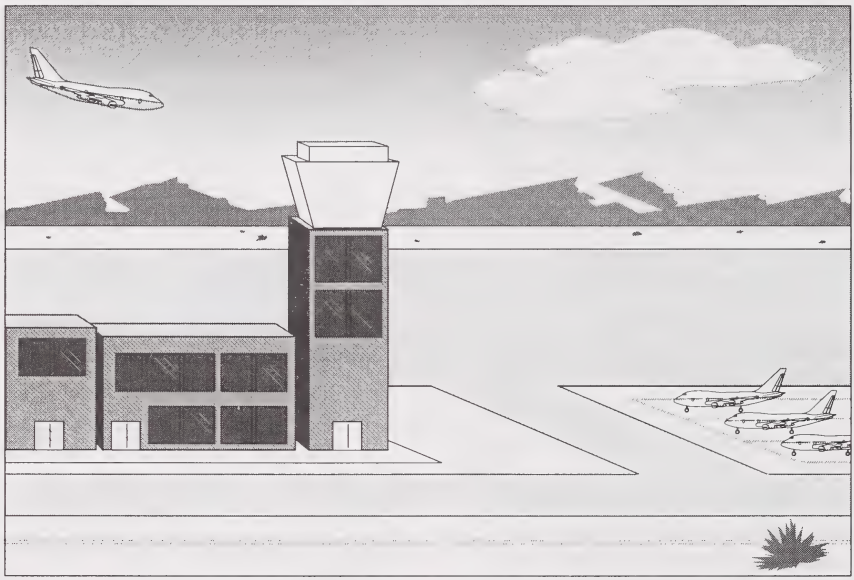
Note: Some contexts may also be drawn from learnings accumulated through grades 4, 5, and 6. The number of questions on the test may vary slightly from those indicated in the reporting category.

Practice Questions

The following practice questions reflect the nature and complexity of the questions that will appear on the Grade 6 Science Achievement Test.

We encourage teachers to familiarize students with the assessment by having them work through these practice questions. Note that these practice questions have been used on previous achievement tests and may be used with students. Items from previous tests remain secured (see *General Information Bulletin*). The questions do not represent the assessment emphasis as presented in the blueprint.

A table of the key and descriptors for the sample questions is found on page 29.



Natalie and Peter were excited about the trip that was planned for their spring vacation. They were going to fly to Vancouver Island to visit their Uncle Jake. At the airport, they would have an opportunity to talk to the pilot of the plane before their flight.

Because Uncle Jake was always teaching them about the outdoors, Natalie and Peter took some science books with them.

The next 12 questions are about their trip.

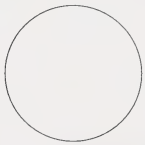
Use the following information to answer question 1.

After they arrived at the airport, the pilot demonstrated aerodynamics by dropping several objects from the same height at the same time. Natalie observed that the paperclip landed on the floor first.

Balloon

Paperclip

Leaf



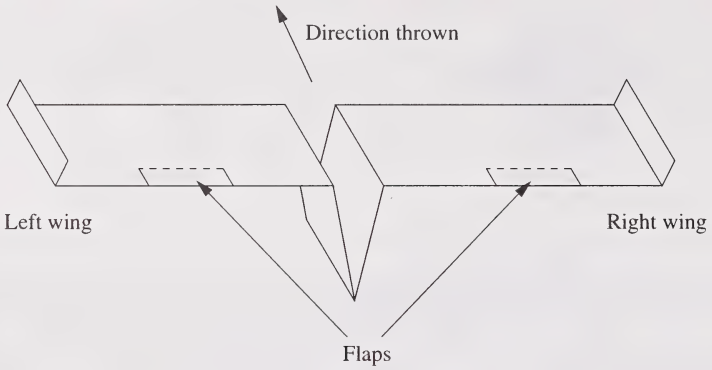
Ping pong ball

1. The pilot explained that the paperclip landed first because it had the

A. least drag
B. least weight
C. most surface area
D. most lift

Use the following information to answer question 2.

Natalie told the pilot that she had experimented with airplane designs in school. She constructed one of the designs with paper, as shown below. When it was first thrown, this paper airplane glided in a straight line.



2. To get the paper airplane to bank to the left on its next flight, Natalie should fold a flap

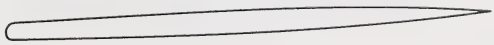
A. down on its right wing and up on its left wing
B. up on its right wing and down on its left wing
C. up on its left wing and up on its right wing
D. down on its right wing and down on its left wing

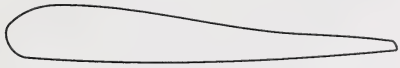
---

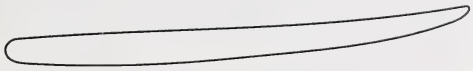
3. The pilot explained that in order for a bird to fly, the force that needs to be greater than the force of gravity is

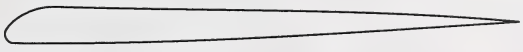
A. lift
B. thrust
C. drag
D. friction

4. Peter knew that wing design and air movement across the wings can affect the amount of lift or drag on a plane. The wing design that would produce the **most** lift is

A. 

B. 

C. 

D. 

Use the following information to answer question 5.

Before their flight, the pilot asked the air traffic control tower for the wind speed and air temperature. He had Peter look at the following wind chill chart.

Wind Chill Chart

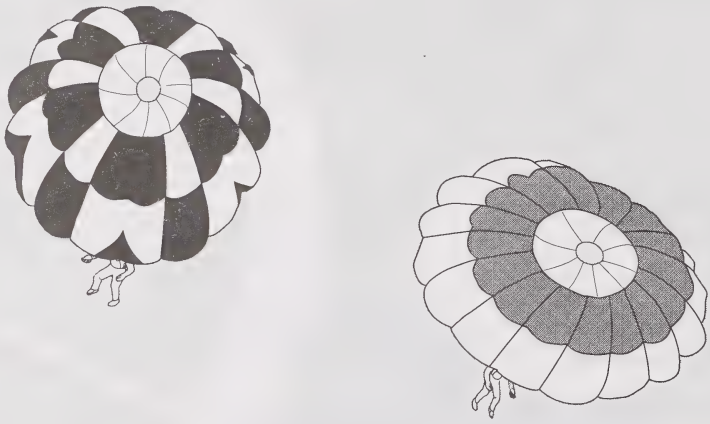
Wind speed km/h	**Temperature °C**							
	0	**–5**	**–10**	**–15**	**–20**	**–25**	**–30**	**–35**
10	–2	–7	–12	–17	–22	–27	–32	–38
20	–7	–13	–19	–25	–31	–37	–43	–50
30	–11	–17	–24	–31	–37	–44	–50	–57
40	–13	–20	–27	–34	–41	–48	–55	–62
50	–15	–22	–29	–36	–44	–51	–58	–66
60	–16	–23	–31	–38	–45	–53	–60	–68

5. If the outside temperature is –5°C, how cold would it feel with a wind speed of 40 km/h?

A. –7°C
B. –13°C
C. –20°C
D. –40°C

Use the following information to answer question 6.

As they approached the airport on Vancouver Island, Natalie watched parachutists landing near the airport.



6. Natalie correctly predicted that if the size of the hole in the top of the parachute is increased, the parachute will

   A. fall more slowly
   B. fall more quickly
   C. rise more slowly
   D. rise more quickly

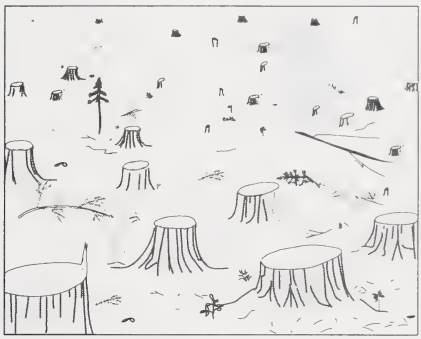
After they landed at the airport, Natalie and Mike were met by Uncle Jake. They grabbed their luggage and headed off to Uncle Jake's cabin in the country.

After a few days, Uncle Jake took them on a hike to a forested area owned by a neighbour.

Use the following information to answer question 7.

Peter saw an area of forest that had been clear-cut. Uncle Jake described what the area looked like before clear-cutting had occurred.

Before clear-cutting



After clear-cutting

7. Because clear-cutting has occurred, Peter predicted that the local owl population will **likely**

A. increase and the mouse population will decrease
B. increase and the mouse population will increase
C. decrease and the mouse population will decrease
D. decrease and the mouse population will increase

---

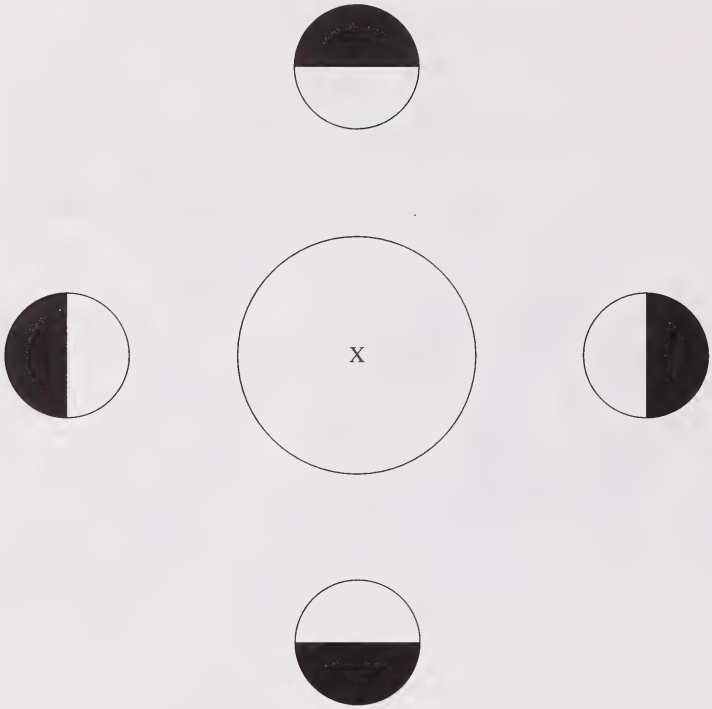
8. Natalie knew that because trees use the Sun's energy to make food and oxygen, they are called

A. consumers
B. producers
C. scavengers
D. decomposers

The following day, they camped overnight near a river.

Use the following information to answer question 9.

They found the following diagram in their science book.

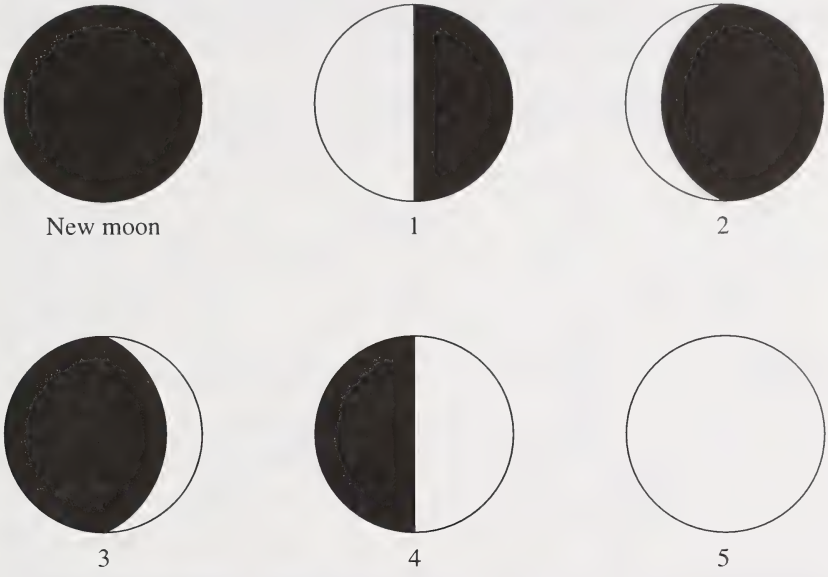


9. In this diagram, X should be labelled as

A. an asteroid
B. a comet
C. a planet
D. a star

Use the following information to answer question 10.

Natalie's science book had pictures of different phases of the moon.
Natalie explained the order for the phases of the moon.

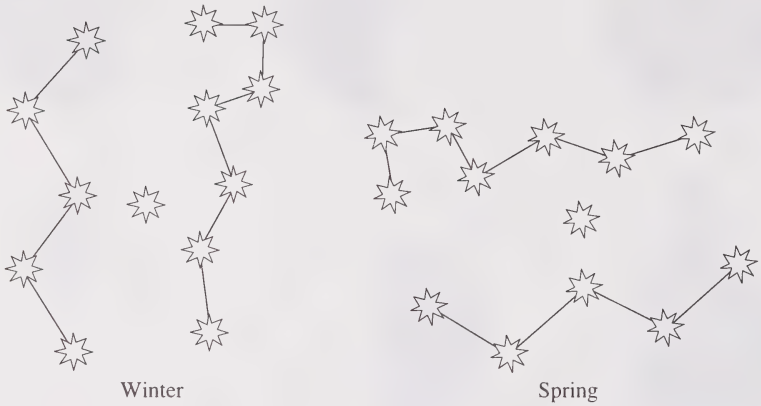


10. Starting from the picture of a new moon, the correct order for the phases of the moon is

A. 2, 3, 5, 1, 4
B. 3, 2, 5, 1, 4
C. 3, 4, 5, 1, 2
D. 2, 1, 5, 3, 4

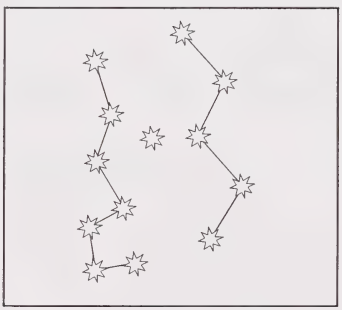
Use the following information to answer question 11.

Peter and Natalie told Uncle Jake about their tour of the Space and Science Centre where they saw representations of the night sky during different seasons of the year. The diagram below shows the location of certain constellations when viewed at midnight.

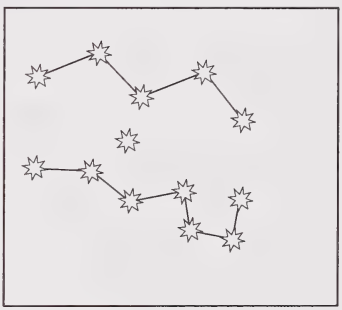


11. The diagram that would **best** illustrate the position of the constellations when viewed at midnight in autumn is

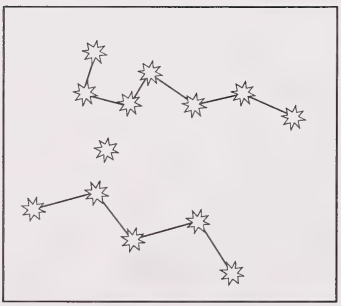
A.



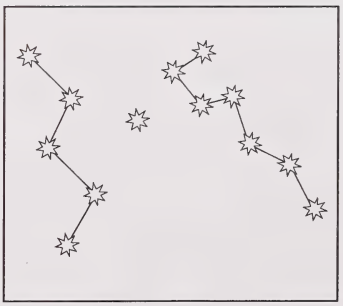
B.



C.



D.



The remainder of their visit with Uncle Jake was as exciting as they had expected. Uncle Jake took the children back to the airport where they boarded the plane for the trip back home.

12. Looking out the window, Peter noticed that a flock of ducks had to change its direction very quickly to avoid hitting the plane. Peter recalled that the adaptation that **best** enables a duck to control the direction of its flight is

A. webbed feet
B. a flat beak
C. hollow bones
D. a flexible tail

Peter and Natalie agreed that they had such a wonderful time at Uncle Jake's that they would plan to visit him again in 1998.

The next three questions are about a science fair held by a Grade 6 class.

Use the following information to answer question 13.

For her science fair project, Kim built a container to keep her lunch cold. She made the following chart.

Material	Insulating Factor
air	3
wood	2
cloth	4
feathers	5
cement	1

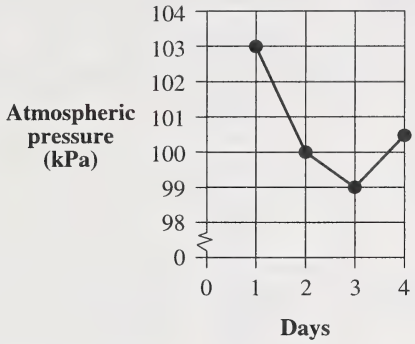
5 is the best insulator
1 is the poorest insulator

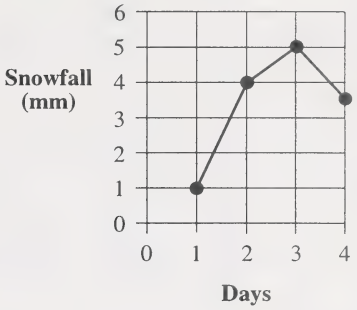
13. From this information, Kim knew that the material that will **best** slow down melting is

A. air
B. feathers
C. cloth
D. wood

Use the following information to answer question 14.

Last winter, Sam and Mae had recorded the atmospheric pressure and amounts of snowfall over a period of four days. They recorded this information in the following graphs:





14. The relationship that the graphs show between atmospheric pressure and snowfall is that

A. the amount of snowfall has no effect on atmospheric pressure
B. when snow starts to fall, atmospheric pressure will increase
C. when atmospheric pressure is rising, it is likely to snow
D. when atmospheric pressure is falling, it is likely to snow

Use the following information to answer question 15.

Nathan had several headaches. He knew that air pressure affects headaches, so for nine days he recorded the air pressure and whether or not he had a headache. He displayed the results on this chart:

Day	Air pressure (kPa)	Headache
1	95	none
2	99	mild
3	99	none
4	101	mild
5	101	none
6	101	none
7	97	mild
8	95	mild
9	95	none

15. The chart shows that Nathan gets a headache when the air pressure

A. stays the same
B. changes
C. is high
D. is low

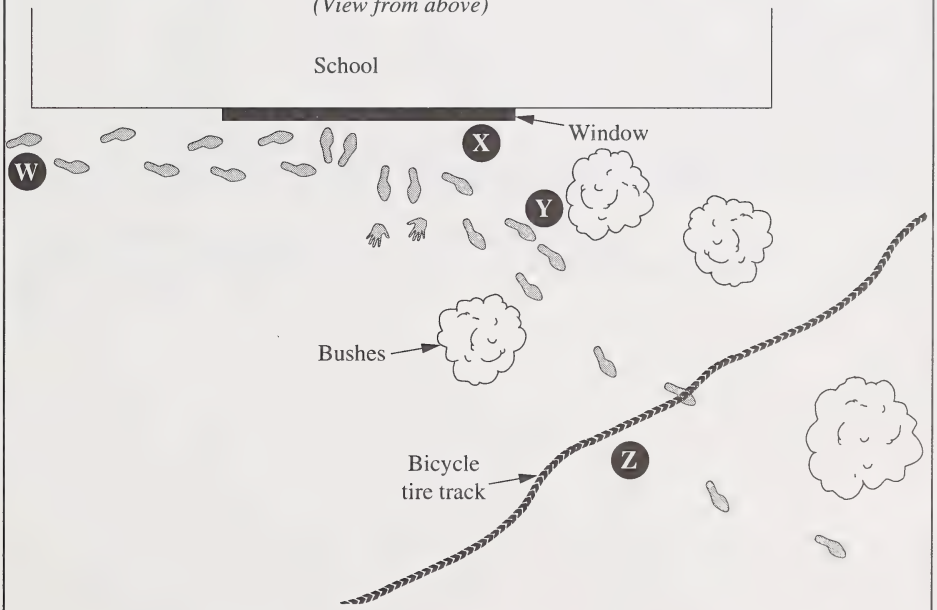
One Monday morning, the principal of Central School discovered that the school mascot, a stuffed mallard duck, was missing from the display case. She immediately called the police to inform them of the theft. Inspector Drake soon arrived to carry out the investigation. Marc and Megan, two junior detectives, arrived a few minutes later. The next two questions are about the investigation.

Use the following information to answer questions 16 and 17.

Inspector Drake examined the area and discovered that the thief had entered through a window. Inspector Drake drew this diagram of what he observed outside the window.

Crime Scene

(View from above)



16. From Inspector Drake's diagram, Megan inferred that the

A. window had been broken
B. thief was a man
C. thief stopped between the bushes to tie his or her shoes
D. bicycle passed by after the thief left

Use the following information to answer question 17.

A torn piece of fabric was found on the rose bush that Inspector Drake thought the thief had passed. When tested at the crime lab, the fabric

- would not absorb water
- was smooth and slippery to the touch
- melted when burned, giving off an unpleasant odour
- showed a smooth, uniform texture with evenly spaced woven fibres (when viewed under a microscope)

17. The fabric is **most likely** a piece of

A. nylon
B. cotton
C. plastic
D. wool

Key and Descriptors for Practice Questions

Item	Key	Reporting Category	Topic*	Curriculum Standard
1	A	Knowledge	AF	Recognize that streamlining reduces drag
2	A	Skills	AF	Infer whether a model airplane will turn right or left
3	A	Knowledge	AF	Recognize that for flight, lift must be greater than gravity
4	B	Knowledge	AF	Identify the wing shape that creates the most lift
5	C	Skills	IPS	Interpret data from a wind-chill chart
6	B	Knowledge	AF	Identify how changes in parachute design will effect descent
7	D	Skills	TF	Predict the interrelationships among living things
8	B	Knowledge	TF	Recognize the function of producers in the nutrient cycle
9	D	Skills	SS	Interpret a diagram to infer that a star emits light
10	C	Knowledge	SS	Order the phases of the Moon
11	B	Skills	SS	Predict the apparent movement of constellations
12	D	Knowledge	AF	Identify the adaptive similarities between birds and airplanes
13	B	Skills	IPS	Read and interpret information presented in a chart
14	D	Skills	IPS	Infer the relationship between variables presented in a graph
15	B	Skills	IPS	Read and interpret information in a chart to infer a pattern
16	D	Skills	EI	Observe and interpret evidence to formulate an inference
17	A	Skills	EI	Apply knowledge of properties and interactions of materials

* IPS—Inquiry and Problem Solving
AF—Aerodynamics and Flight
TF—Trees and Forests
SS—Sky Science
EI—Evidence and Investigation

Preparing Students for the Test

We hope that teachers share the following information with their students to help them prepare for the science test.

- Talk with your students about some of the positive and negative aspects of taking tests. Share some of your own experiences and have your students share theirs.

- Familiarize your students with the format of the achievement test and the kinds of questions that will appear on it by having them work through the sample questions.

Suggestions for Answering Multiple-Choice Questions

Students should use information given for answering questions by:

— reading the information and thinking carefully about it before trying to answer any of the questions that need the information OR

— reading the questions first and then reading the information, keeping in mind the questions they need to answer

When information is given for more than one question, students should go back to the information before answering each question.

Students should make sure they look at all forms of information given. Information may be given in words, charts, pictures, graphs, and maps.

Students should choose the answer they think is best. If they don't see a correct or best answer right away, they are encouraged to find the two choices that seem closest to the correct answer and pick one of them for the answer.

For further suggestions, see *Teaching Students with Learning Disabilities*, Alberta Education, Special Education Branch pages LD 122 to 124.

Interim Policy: Use of Calculators on Alberta Education Achievement Tests

September 1997

Rationale

Recent changes in the program of study for mathematics require students to become familiar with the use of a calculator in order to complete complex computations or verify solutions to problems. The increased availability of technology in schools helps students to solve complex, real-life multistep problems.

Questions on future Grade 9 Mathematics Achievement tests will include real-life problems involving more than a single step. Students will need to use a scientific calculator when writing the Grade 9 Mathematics Achievement Test; trigonometric tables are **not** provided. Tests are constructed to ensure that the use of particular models of calculators neither advantages nor disadvantages individual students.

Definition

This policy considers a scientific calculator to be a handheld device designed for complex mathematical computations. Included in this definition are those calculators having the capabilities of performing calculations involving square root, sine, cosine, and tangent. Calculators that have more sophisticated features such as graphing capabilities, built-in formulas, mathematical functions, or other programmable capabilities are included in this definition, but are not required in Grade 9 Mathematics.

Policy

Grade 9: To ensure equity and fairness for all students and compatibility with the provincial *Program of Studies*, Alberta Education **expects** students to use scientific calculators, as defined above, when writing the Grade 9 Mathematics Achievement Test.

Grade 6: Those Grade 6 students for whom the four-function calculator is a familiar classroom tool **are encouraged**, **but not required**, to use a calculator when writing the Grade 6 Mathematics Achievement Test.

Grade 3: From their early years in school, students are expected to become increasingly familiar with calculators and confident in using them to solve problems. Nevertheless, students need to have mastered basic addition facts (to 18), subtraction facts (to 18), and multiplication facts (to 49). To respect this principle as well as the problem-solving nature of the new curriculum, there will be two components to the Grade 3 Mathematics Achievement Test. Those students for whom the four-function calculator is a familiar classroom tool **are encouraged, but not required**, to use a calculator when writing the multiple-choice component of the Grade 3 Mathematics Achievement Test; however, they **shall not** use calculators when writing the Timed Number Facts component of the test.

Alberta Education Contact

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